

identified an enzyme, “convertase”, in human myocardium that converts angiotensin I to angiotensin II and that enables local AII formation in the face of ACE inhibition by captopril. Thus, the heart benefits from the peripheral effects of captopril, but it does not lose the inotropic benefit of angiotensin II.

When heart failure patients are being treated with captopril, angiotensin I levels get very high. Because the heart is bathed in blood in which angiotensin I levels may be many times higher than normal, the substrate for myocardial conversion from angiotensin I to angiotensin II is correspondingly greater.

These effects, which require further study, have significant implications for the management of post-MI cardiac remodeling, as well as for the patient with congestive heart failure.

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## FOOT CARE IN DIABETES: VIGILANT INSPECTION STILL BEST

It is up to the physician to identify signs of trouble that could lead to lower extremity amputation in diabetic patients, because patients themselves may not notice and report potentially serious problems. Diabetes mellitus is the leading cause of nontraumatic lower extremity amputation, and about half of these amputations are preventable. Yet only 10% of the 5 to 7.5 million diabetic persons in the United States seek help for neuropathic symptoms such as numbness. This loss of sensation due to neuropathy often allows treatable

callus formations, fissures, ulcerations, and altered biomechanics to develop which are often unrecognized by the patient.

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#### PROGRESSION OF DISEASE

Neuropathy, peripheral vascular disease, and infection are the major predisposing factors that lead to lower extremity amputation. In addition to loss of sensation, neuropathy alters sweating patterns and skin lubrication, increasing the susceptibility to drying, cracking, and bacterial invasion. Because of blunted sensation, problems such as cracked calluses, blisters, fungal infections, foreign bodies in the shoes, and burns can remain undetected for prolonged periods. Significant neuropathy can occur even in relatively “mild” diabetes; severity is thought to be related to duration of disease.

The diffuse peripheral vascular disease common to diabetic patients compromises healing capacity. Impaired blood flow to lower extremity ulcers reduces healing and defense against infection. However, foot problems can occur even in the absence of significant vascular disease, and patients with normal pulses still may be at risk of significant foot deformity and injury.

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#### CLINICAL PRESENTATION

Since patients with numbness from neuropathy do not note any discomfort from pressure points on their feet, callus formation and ulceration may occur, especially over the metatarsal heads. Furthermore, because of weak intrinsic muscles of the foot, the toes may become clawed—pulled up by the stronger muscles of the calf. Claw-foot deformity alters the biomechanics of the foot so that more weight is placed on the metatarsal heads. Underneath the resulting callus, inflammatory autolysis occurs, then hemorrhaging and tissue necrosis—all painless to the patient and not immediately obvious to an untrained observer. Eventually a serous cavity forms and ruptures, with ulceration.

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#### MANAGEMENT

Evidence is accumulating that rigorous control of blood glucose slows and may even reverse the progression of neuropathy, but more studies are needed before conclusions can be drawn about the relationship between blood glucose and neuropathy. In the meantime, patient education and active physician participation are essential to prevent and treat diabetic foot problems.

**Show—don't tell—how to check feet**

It has been demonstrated that if a health professional consistently examines the patient's feet, the patient is more likely to follow a regular foot inspection regimen than if a physician or nurse simply *tells* him to examine his feet. The patient or companion must be shown how to examine the feet and identify signs of trouble, such as corns or calluses, untrimmed nails, ingrown toenails, and dry skin.

**Thorough examination, aggressive follow-up**

The feet of patients with diabetes should be inspected at the time of visits with the physician. Assessment for neuropathy should include a check for Achilles deep tendon reflex, vibratory sensation, sharp/dull discrimination, and proprioception. Complaints of numbness, paresthesia, or burning are symptoms of neuropathy and warrant aggressive follow-up.

The patient's shoes should be checked frequently for proper fit. With inadequate sensation, a patient with neuropathy may continue to wear shoes that irritate the skin and cause calluses and eventually ulcers. Orthotic shoes are often needed to distribute weight away from problem areas. A custom-molded shoe or a shoe with an extra-depth inlay will help dissipate the pressure on the plantar aspect of the foot.

Ongoing care includes debridement of ulcerations,

padding of calluses and corns, proper trimming of nails, care of ingrown toenails, and moisturizing creams and ointments for dry skin.

Hammertoe deformities may require surgical repair. In this situation, there is usually a corn at the top of the toe with retrograde pressure to the head of the metatarsal. If the toe can be relaxed to a weight-bearing position, both pressure points will be relieved.

Ulcer with underlying deformity to the metatarsal also requires surgical intervention; the patient may be unable to walk without causing recurrent ulceration. Surgical resection or planing of the metatarsal head may be needed to keep the foot ulcer-free.

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